

UNITED STATES NAVAL OBSERVATORY

CIRCULAR NO. 126

U. S. Naval Observatory, Washington, D. C. 20390

November 5, 1969

Annular Solar Eclipse of 31 August - 1 September 1970

by

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GENERAL INFORMATION

The path of the annular phase of the solar eclipse of 31 August - 1 September touches the earth at sunrise on the Bismarck Sea and on the extreme northeast coast of New Guinea when the duration is $5^m 13^s.2$ and the width of path is 190 miles. Traveling in an easterly direction, the path crosses the islands of New Britain, New Ireland, small islands and atolls of the Bismarck Archipelago and of the Solomon Islands. The path passes north of the larger islands of the Solomon Islands and of the Santa Cruz Islands and south of the Gilbert Islands.

Traveling in a southeasterly direction, the path crosses the Ellice Islands and the Samoa Islands. From $20^h 49^m$ U.T. to $21^h 08^m$ U.T., the path travels along the International Date Line. The eclipse reaches maximum duration of $6^m 43^s.6$ at $21^h 41^m$ U.T. over the South Pacific Ocean southeast of the Samoa Islands when the width of path is 164 miles. The path passes east of the Fiji and the Tonga Islands and west of the Cook Islands.

Continuing in a southeasterly direction over the South Pacific Ocean, the path of the annular phase leaves the earth at sunset between latitudes -58° and -61° , and at longitude $+98^\circ$ when the duration is $5^m 12^s.5$ and the width of path is 191 miles.

Partial phases of the eclipse of greater or less magnitude, decreasing with the distance from the path of annular phase, will be visible over the eastern half of Australia, New Guinea, New Zealand, the islands of the South Pacific Ocean, a small portion of Antarctica, and most of the South Pacific Ocean.

The predictions in this *Circular* are derived from the basic data in the American Ephemeris and Nautical Almanac for the Year 1970. The arguments are in Universal Time, and longitudes west of the Greenwich meridian are positive. The solar ephemeris was referred to the same equinox as the lunar ephemeris by applying a provisional correction of 1.34 seconds. The value of ΔT , used in the computations is 39.1 seconds.

The value of 0.2724880 for k has been used in these calculations. In the local circumstances, the angle P is the position angle of the point of contact, measured eastward from the north point of the solar limb, and the angle V is the position angle of the point of contact, measured eastward from the vertical circle. The duration, tabulated in the local circumstances, is derived from the second and third contacts.

The circumstances of the eclipse are plotted by the Nautical Almanac Office on

GENERAL INFORMATION (Continued)

portions of the Air Navigation Charts Series V30, and HO 1500 of the United States Navy Oceanographic Office.

This *Circular* contains the following information: The Eclipse Map from the American Ephemeris and Nautical Almanac, p. 4; The Path of the Annular Phase, p. 5; The Central Line, Duration and Width of Path at 10,000 feet, 20,000 feet, 30,000 feet, and 40,000 feet, pp. 6,7; The Central Line, Duration and Width of Path at 80 km, 100 km, 200 km, and 300 km, pp. 8,9; Local Circumstances for Points on the Central Line, pp. 10,11; Local Circumstances for Geographic Locations for both Annular and Partial Phase, pp. 12,13; Maps of Portions of the Path, pp. 14-19; Map of the Path, p. 21.

It is requested that precise observations of contact times of this eclipse, as well as the coordinates of the place of observation be reported to

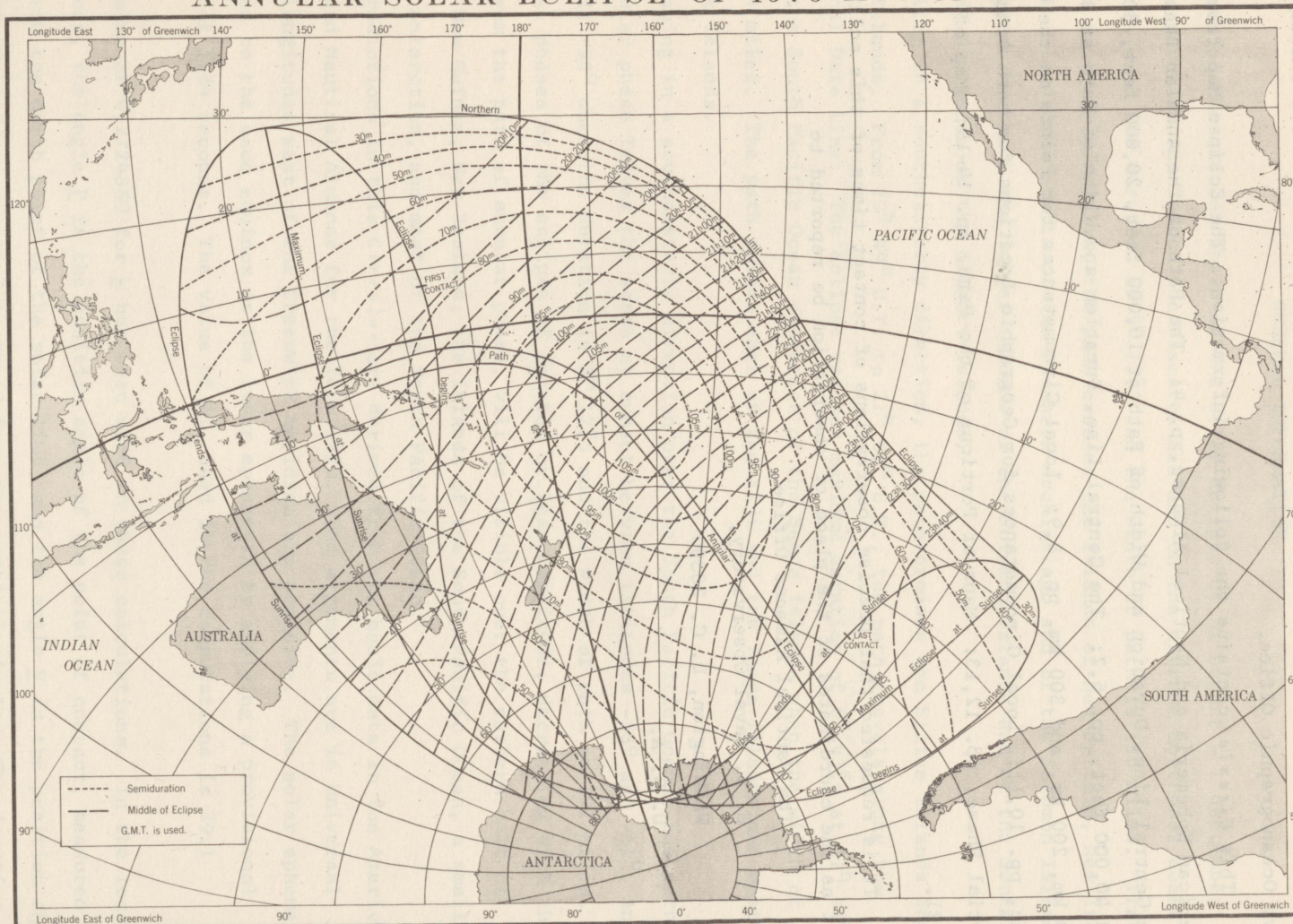
The Nautical Almanac Office,

U. S. Naval Observatory,

Washington, D. C. 20390

U. S. A.

ANNULAR SOLAR ECLIPSE OF 1970 AUG. 31- SEPT. 1



PATH OF THE ANNULAR PHASE

Universal Time h m	Northern Limit		Central Line		Southern Limit	
	Latitude ° ' "	Longitude ° ' "	Latitude ° ' "	Longitude ° ' "	Latitude ° ' "	Longitude ° ' "
Limit	- 3 22	-147 16	- 4 47	-147 08	- 6 13	-146 59
20 15	2 26.4	156 00.9	4 15.0	151 06.7	.. ..	... ..
16	2 20.2	158 05.7	3 53.7	154 44.1	.. ..	... ..
17	2 17.4	159 47.0	3 44.6	157 01.5	5 26.0	153 03.2
18	2 16.9	161 13.7	3 40.1	158 49.2	5 12.3	155 43.6
20 20	- 2 20.0	-163 39.7	- 3 38.1	-161 39.4	- 5 01.8	-159 18.3
22	2 26.7	165 41.6	3 41.6	163 55.4	5 00.6	161 55.6
24	2 36.0	167 27.5	3 48.4	165 50.6	5 04.3	164 03.9
26	2 47.1	169 01.6	3 57.6	167 31.4	5 11.0	165 53.7
28	2 59.7	170 26.8	4 08.5	169 01.7	5 20.0	167 30.4
20 30	- 3 13.5	-171 44.7	- 4 20.9	-170 23.6	- 5 30.7	-168 57.4
35	3 52.1	174 35.5	4 56.5	173 21.6	6 03.1	172 04.0
40	4 35.2	177 01.1	5 37.2	175 51.9	6 41.1	174 39.8
45	5 21.7	-179 08.6	6 21.6	178 02.6	7 23.5	176 54.4
50	6 11.0	+178 57.8	7 09.2	-179 58.7	8 09.1	-178 53.4
55	7 02.7	177 15.1	7 59.2	+178 16.6	8 57.6	+179 19.7
21 00	- 7 56.4	+175 41.1	- 8 51.6	+176 41.0	- 9 48.5	+177 42.4
05	8 52.0	174 14.3	9 45.9	175 12.9	10 41.5	176 12.9
10	9 49.3	172 53.4	10 42.1	173 51.0	11 36.6	174 49.7
15	10 48.2	171 37.4	11 40.0	172 34.1	12 33.5	173 31.8
20	11 48.6	170 25.6	12 39.6	171 21.5	13 32.1	172 18.3
25	12 50.5	169 17.1	13 40.7	170 12.3	14 32.4	171 08.4
21 30	-13 53.9	+168 11.5	-14 43.4	+169 06.1	-15 34.5	+170 01.5
35	14 58.7	167 08.0	15 47.6	168 02.1	16 38.1	168 57.0
40	16 04.9	166 06.4	16 53.4	166 59.9	17 43.4	167 54.3
45	17 12.5	165 06.0	18 00.7	165 59.1	18 50.4	166 53.0
50	18 21.7	164 06.4	19 09.6	164 59.1	19 59.1	165 52.6
55	19 32.3	163 07.1	20 20.2	163 59.5	21 09.6	164 52.6
22 00	-20 44.5	+162 07.9	-21 32.5	+162 59.9	-22 21.9	+163 52.6
05	21 58.4	161 08.1	22 46.5	161 59.7	23 36.1	162 52.1
10	23 13.9	160 07.3	24 02.4	160 58.6	24 52.3	161 50.6
15	24 31.4	159 05.0	25 20.3	159 56.0	26 10.7	160 47.6
20	25 50.7	158 00.7	26 40.3	158 51.3	27 31.3	159 42.5
25	27 12.2	156 53.6	28 02.5	157 43.8	28 54.4	158 34.6
22 30	-28 36.0	+155 43.2	-29 27.3	+156 32.9	-30 20.2	+157 23.2
35	30 02.3	154 28.6	30 54.8	155 17.7	31 49.0	156 07.3
40	31 31.3	153 08.7	32 25.3	153 57.1	33 21.0	154 45.8
45	33 03.4	151 42.5	33 59.1	152 29.8	34 56.7	153 17.5
50	34 39.0	150 08.2	35 36.8	150 54.2	36 36.5	151 40.5
55	36 18.5	148 24.1	37 18.8	149 08.4	38 21.2	149 52.7
23 00	-38 02.7	+146 27.5	-39 05.9	+147 09.3	-40 11.4	+147 50.9
05	39 52.2	144 14.8	40 59.0	144 53.1	42 08.5	145 30.9
10	41 48.4	141 41.0	42 59.5	142 14.2	44 13.9	142 46.0
15	43 52.8	138 38.1	45 09.5	139 03.3	46 30.2	139 25.8
20	46 08.1	134 52.9	47 32.3	135 04.8	49 01.6	135 11.3
23 22	-47 06.3	+133 06.0	-48 34.2	+133 10.0	-50 08.0	+133 06.6
24	48 07.4	131 06.0	49 39.7	130 59.7	51 19.0	130 42.7
26	49 12.0	128 49.3	50 49.7	128 28.7	52 35.9	127 52.5
28	50 21.2	126 10.1	52 05.7	125 28.9	54 01.1	124 22.8
30	51 36.6	122 58.7	53 30.4	121 44.8	55 39.7	119 45.7
23 31	-52 17.5	+121 05.7	-54 17.5	+119 26.8	-56 37.7	+116 40.7
32	53 01.2	118 56.2	55 09.6	116 41.1	57 47.3	112 30.5
33	53 48.9	116 23.5	56 09.6	113 09.1	59 33.8	104 43.4
34	54 42.5	113 14.4	57 26.6	107 53.4	.. ..	... ..
Limit	-57 54	+ 97 47	-59 16	+ 98 12	-60 38	+ 98 41

CENTRAL LINE OF ANNULAR ECLIPSE

Universal Time	10,000 Feet		20,000 Feet		30,000 Feet		40,000 Feet	
	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
20 15	- 4 11.6	-151 23.5	- 4 08.4	-151 48.6	- 4 05.4	-152 07.3	- 4 02.6	-152 25.0
16	3 51.8	154 55.5	3 50.0	155 06.7	3 48.2	155 17.7	3 46.4	155 28.4
17	3 43.1	157 10.2	3 41.7	157 18.8	3 40.3	157 27.3	3 38.9	157 35.6
18	3 38.8	158 56.5	3 37.6	159 03.7	3 36.4	159 10.8	3 35.2	159 17.9
20 20	- 3 37.1	-161 45.1	- 3 36.1	-161 50.8	- 3 35.1	-161 56.4	- 3 34.1	-162 02.0
22	3 40.7	164 00.2	3 39.9	164 05.0	3 39.0	164 09.8	3 38.1	164 14.5
24	3 47.6	165 54.8	3 46.8	165 59.0	3 46.0	166 03.2	3 45.2	166 07.4
26	3 56.8	167 35.2	3 56.1	167 39.0	3 55.4	167 42.8	3 54.6	167 46.6
28	4 07.8	169 05.2	4 07.1	169 08.6	4 06.4	169 12.1	4 05.7	169 15.5
20 30	- 4 20.2	-170 26.8	- 4 19.5	-170 30.0	- 4 18.9	-170 33.2	- 4 18.2	-170 36.4
35	4 55.9	173 24.3	4 55.2	173 27.0	4 54.6	173 29.7	4 54.0	173 32.4
40	5 36.6	175 54.2	5 36.0	175 56.6	5 35.4	175 58.9	5 34.8	176 01.3
45	6 21.0	-178 04.7	6 20.4	-178 06.8	6 19.9	-178 08.9	6 19.3	-178 11.0
50	7 08.6	+179 59.4	7 08.0	+179 57.5	7 07.4	+179 55.6	7 06.8	+179 53.8
55	7 58.7	178 14.9	7 58.1	178 13.2	7 57.5	178 11.5	7 56.9	178 09.8
21 00	- 8 51.0	+176 39.5	- 8 50.4	+176 37.9	- 8 49.8	+176 36.4	- 8 49.2	+176 34.8
05	9 45.3	175 11.5	9 44.7	175 10.1	9 44.1	175 08.7	9 43.4	175 07.3
10	10 41.5	173 49.7	10 40.8	173 48.4	10 40.2	173 47.1	10 39.5	173 45.8
15	11 39.4	172 32.9	11 38.7	172 31.7	11 38.0	172 30.5	11 37.4	172 29.3
20	12 38.9	171 20.4	12 38.2	171 19.3	12 37.5	171 18.2	12 36.8	171 17.1
25	13 40.0	170 11.3	13 39.3	170 10.3	13 38.6	170 09.3	13 37.9	170 08.3
21 30	-14 42.7	+169 05.1	-14 41.9	+169 04.2	-14 41.2	+169 03.3	-14 40.4	+169 02.4
35	15 46.9	168 01.3	15 46.1	168 00.4	15 45.3	167 59.6	15 44.5	167 58.7
40	16 52.6	166 59.2	16 51.8	166 58.4	16 51.0	166 57.7	16 50.2	166 56.9
45	17 59.9	165 58.4	17 59.0	165 57.7	17 58.2	165 57.0	17 57.4	165 56.3
50	19 08.8	164 58.5	19 07.9	164 57.9	19 07.0	164 57.3	19 06.1	164 56.6
55	20 19.3	163 59.0	20 18.4	163 58.4	20 17.4	163 57.9	20 16.5	163 57.3
22 00	-21 31.5	+162 59.4	-21 30.5	+162 58.9	-21 29.6	+162 58.5	-21 28.6	+162 58.0
05	22 45.5	161 59.4	22 44.5	161 59.0	22 43.5	161 58.6	22 42.5	161 58.2
10	24 01.3	160 58.3	24 00.3	160 58.0	23 59.2	160 57.7	23 58.2	160 57.4
15	25 19.2	159 55.7	25 18.0	159 55.5	25 16.9	159 55.3	25 15.8	159 55.0
20	26 39.1	158 51.1	26 37.9	158 51.0	26 36.8	158 50.8	26 35.6	158 50.7
25	28 01.3	157 43.8	28 00.1	157 43.7	27 58.9	157 43.6	27 57.7	157 43.6
22 30	-29 26.0	+156 32.9	-29 24.8	+156 33.0	-29 23.5	+156 33.0	-29 22.2	+156 33.1
35	30 53.5	155 17.8	30 52.1	155 18.0	30 50.8	155 18.1	30 49.4	155 18.2
40	32 23.9	153 57.3	32 22.4	153 57.6	32 21.0	153 57.8	32 19.6	153 58.1
45	33 57.6	152 30.2	33 56.1	152 30.6	33 54.6	152 31.0	33 53.1	152 31.4
50	35 35.2	150 54.8	35 33.6	150 55.4	35 32.0	150 55.9	35 30.4	150 56.5
55	37 17.1	149 09.1	37 15.4	149 09.9	37 13.7	149 10.6	37 12.0	149 11.4
23 00	-39 04.0	+147 10.3	-39 02.2	+147 11.3	-39 00.4	+147 12.3	-38 58.6	+147 13.3
05	40 57.0	144 54.5	40 55.1	144 55.8	40 53.1	144 57.0	40 51.1	144 58.3
10	42 57.4	142 15.9	42 55.3	142 17.6	42 53.2	142 19.2	42 51.0	142 20.9
15	45 07.2	139 05.5	45 04.8	139 07.8	45 02.5	139 10.0	45 00.2	139 12.3
20	47 29.7	135 07.9	47 27.1	135 11.0	47 24.5	135 14.1	47 21.9	135 17.2
23 22	-48 31.4	+133 13.6	-48 28.7	+133 17.2	-48 25.9	+133 20.8	-48 23.2	+133 24.4
24	49 36.7	131 03.9	49 33.8	131 08.2	49 30.9	131 12.3	49 28.0	131 16.5
26	50 46.6	128 33.8	50 43.4	128 38.9	50 40.3	128 43.9	50 37.2	128 48.9
28	52 02.3	125 35.2	51 58.9	125 41.4	51 55.5	125 47.6	51 52.2	125 53.8
30	53 26.6	121 53.1	53 22.8	122 01.2	53 19.0	122 09.3	53 15.2	122 17.3
23 31	-54 13.4	+119 36.6	-54 09.3	+119 46.3	-54 05.3	+119 55.9	-54 01.2	+120 05.3
32	55 05.1	116 53.2	55 00.6	117 05.2	54 56.1	117 16.9	54 51.7	117 28.5
33	56 04.3	113 25.4	55 59.1	113 41.4	55 54.0	113 57.0	55 48.9	114 12.2
34	-57 19.5	+108 21.3	-57 12.6	+108 47.7	-57 05.8	+109 12.8	-56 59.3	+109 36.8

DURATION OF ANNULAR PHASE AND WIDTH OF PATH ON CENTRAL LINE

Universal Time h m	10,000 Feet		20,000 Feet		30,000 Feet		40,000 Feet	
	Duration	Width of Path mi	Duration	Width of Path mi	Duration	Width of Path mi	Duration	Width of Path mi
20 15	5 20.0	190	5 20.5	189	5 21.0	189	5 21.5	189
16	5 25.9	188	5 26.3	188	5 26.6	188	5 26.9	188
17	5 30.1	188	5 30.3	188	5 30.6	187	5 30.8	187
18	5 33.5	187	5 33.7	187	5 33.9	187	5 34.1	187
20 20	5 39.2	187	5 39.4	187	5 39.6	187	5 39.7	187
22	5 44.0	186	5 44.2	186	5 44.3	187	5 44.5	187
24	5 48.3	186	5 48.4	186	5 48.6	187	5 48.7	187
26	5 52.1	186	5 52.3	186	5 52.4	187	5 52.5	186
28	5 55.7	186	5 55.8	186	5 55.9	186	5 56.1	186
20 30	5 59.0	186	5 59.1	186	5 59.2	186	5 59.3	186
35	6 06.3	186	6 06.4	186	6 06.6	186	6 06.7	186
40	6 12.7	185	6 12.8	185	6 12.9	185	6 13.0	185
45	6 18.2	184	6 18.3	184	6 18.4	184	6 18.5	184
50	6 23.0	183	6 23.1	183	6 23.2	183	6 23.3	183
55	6 27.2	182	6 27.3	182	6 27.4	182	6 27.5	182
21 00	6 30.9	180	6 30.9	180	6 31.0	180	6 31.1	180
05	6 34.0	178	6 34.0	179	6 34.1	179	6 34.2	179
10	6 36.6	177	6 36.7	177	6 36.7	176	6 36.8	176
15	6 38.7	174	6 38.8	175	6 38.9	175	6 39.0	175
20	6 40.5	172	6 40.6	172	6 40.6	172	6 40.7	172
25	6 41.8	170	6 41.9	170	6 42.0	170	6 42.1	170
21 30	6 42.8	168	6 42.9	168	6 43.0	168	6 43.0	168
35	6 43.4	166	6 43.5	166	6 43.6	166	6 43.6	166
40	6 43.7	164	6 43.8	163	6 43.8	164	6 43.9	164
45	6 43.6	162	6 43.7	162	6 43.8	162	6 43.9	162
50	6 43.3	160	6 43.4	160	6 43.5	160	6 43.5	160
55	6 42.7	159	6 42.8	159	6 42.8	158	6 42.9	158
22 00	6 41.8	157	6 41.9	157	6 41.9	157	6 42.0	156
05	6 40.7	155	6 40.7	156	6 40.8	156	6 40.9	156
10	6 39.3	155	6 39.3	155	6 39.4	154	6 39.5	154
15	6 37.6	154	6 37.7	153	6 37.7	153	6 37.8	153
20	6 35.7	153	6 35.8	152	6 35.9	152	6 35.9	152
25	6 33.6	152	6 33.7	152	6 33.7	152	6 33.8	152
22 30	6 31.2	151	6 31.3	152	6 31.4	152	6 31.5	152
35	6 28.6	151	6 28.7	152	6 28.8	152	6 28.8	152
40	6 25.7	151	6 25.8	152	6 25.9	152	6 26.0	152
45	6 22.6	152	6 22.7	152	6 22.8	152	6 22.8	152
50	6 19.2	152	6 19.3	152	6 19.3	152	6 19.4	152
55	6 15.5	153	6 15.5	153	6 15.6	153	6 15.7	153
23 00	6 11.4	155	6 11.5	155	6 11.5	155	6 11.6	154
05	6 06.9	156	6 07.0	156	6 07.1	156	6 07.1	156
10	6 01.9	158	6 02.0	158	6 02.1	158	6 02.2	158
15	5 56.4	160	5 56.5	160	5 56.6	160	5 56.7	160
20	5 50.1	163	5 50.2	163	5 50.3	164	5 50.4	163
23 22	5 47.2	165	5 47.3	165	5 47.5	164	5 47.6	164
24	5 44.2	167	5 44.3	167	5 44.4	167	5 44.5	166
26	5 40.9	169	5 41.0	168	5 41.1	168	5 41.2	168
28	5 37.2	171	5 37.3	171	5 37.5	171	5 37.6	171
30	5 33.0	174	5 33.1	174	5 33.3	174	5 33.4	173
23 31	5 30.5	175	5 30.7	175	5 30.9	175	5 31.0	175
32	5 27.8	178	5 28.0	178	5 28.2	177	5 28.4	177
33	5 24.5	180	5 24.8	180	5 25.0	179	5 25.2	179
34	5 20.1	184	5 20.5	183	5 20.8	183	5 21.2	183

CENTRAL LINE OF ANNULAR ECLIPSE

Universal Time	80 Km		100 Km		200 Km		300 Km	
	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
h m	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "
20 09	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	- 2 23.9	-154 43.1
10	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	2 11.1	157 20.7
11	.. .. .	.. .. .	.. .. .	.. .. .	- 2 58.5	-153 41.1	2 04.5	159 17.0
12	.. .. .	.. .. .	.. .. .	.. .. .	2 43.7	156 32.2	2 01.3	160 52.5
13	- 4 00.6	-149 48.6	- 3 35.2	-152 30.7	2 36.6	158 34.2	2 00.1	162 14.8
20 14	- 3 30.2	-154 23.9	- 3 17.9	-155 40.2	- 2 33.0	-160 13.2	- 2 00.3	-163 27.8
16	3 13.9	158 44.5	3 05.9	159 32.2	2 31.7	162 53.0	2 03.9	165 34.5
18	3 10.8	161 39.5	3 04.3	162 16.9	2 35.3	165 02.4	2 10.4	167 22.8
20 20	- 3 13.5	-163 57.9	- 3 07.9	-164 29.4	- 2 41.9	-166 52.9	- 2 19.0	-168 58.3
25	3 52.0	166 46.5	3 51.2	166 50.5	3 50.4	166 54.5	3 49.7	166 58.5
30	4 03.7	171 44.8	3 59.6	172 04.3	3 39.8	173 36.7	3 21.4	175 02.3
35	4 40.4	174 30.6	4 36.6	174 47.3	4 17.8	176 07.1	4 00.2	177 21.8
20 40	- 5 21.7	-176 52.2	- 5 17.9	-177 06.8	- 4 59.7	-178 17.2	- 4 42.4	-179 23.6
45	6 06.4	-178 56.3	6 02.7	-179 09.3	5 44.6	+179 47.7	5 27.3	+178 48.0
50	6 53.9	+179 13.0	6 50.2	+179 01.2	6 32.0	178 04.3	6 14.6	177 10.1
55	7 43.8	177 32.8	7 40.0	177 22.1	7 21.6	176 30.3	7 04.0	175 40.9
21 00	- 8 35.9	+176 01.1	- 8 32.0	+175 51.4	- 8 13.2	+175 04.0	- 7 55.1	+174 18.7
05	9 29.8	174 36.4	9 25.9	174 27.4	9 06.5	173 44.0	8 47.9	173 02.4
10	10 25.5	173 17.4	10 21.4	173 09.2	10 01.5	172 29.3	9 42.3	171 51.0
15	11 22.9	172 03.3	11 18.6	171 55.7	10 58.1	171 19.0	10 38.2	170 43.8
20	12 21.8	170 53.1	12 17.4	170 46.2	11 56.1	170 12.4	11 35.4	169 40.0
25	13 22.2	169 46.3	13 17.7	169 40.0	12 55.5	169 08.9	12 34.1	168 39.2
21 30	-14 24.2	+168 42.3	-14 19.5	+168 36.4	-13 56.4	+168 08.0	-13 34.1	+167 40.7
35	15 27.6	167 40.4	15 22.7	167 35.1	14 58.7	167 09.1	14 35.4	166 44.2
40	16 32.5	166 40.2	16 27.4	166 35.4	16 02.3	166 11.8	15 38.1	165 49.2
45	17 39.0	165 41.3	17 33.6	165 37.0	17 07.4	165 15.7	16 42.2	164 55.3
50	18 46.9	164 43.2	18 41.3	164 39.3	18 14.0	164 20.4	17 47.6	164 02.2
55	19 56.4	163 45.5	19 50.6	163 42.1	19 22.0	163 25.4	18 54.4	163 09.4
22 00	-21 07.6	+162 47.8	-21 01.5	+162 44.8	-20 31.6	+162 30.4	-20 02.8	+162 16.7
05	22 20.5	161 49.6	22 14.1	161 47.1	21 42.8	161 35.0	21 12.7	161 23.5
10	23 35.1	160 50.5	23 28.4	160 48.5	22 55.7	160 38.8	22 24.1	160 29.5
15	24 51.7	159 49.9	24 44.7	159 48.4	24 10.4	159 41.2	23 37.3	159 34.3
20	26 10.3	158 47.4	26 02.9	158 46.4	25 27.0	158 41.8	24 52.3	158 37.3
25	27 31.0	157 42.2	27 23.3	157 41.9	26 45.6	157 40.0	26 09.3	157 38.2
22 30	-28 54.2	+156 33.9	-28 46.1	+156 34.1	-28 06.4	+156 35.2	-27 28.3	+156 36.3
35	30 19.9	155 21.4	30 11.4	155 22.3	29 29.6	155 26.7	28 49.5	155 30.8
40	31 48.5	154 03.9	31 39.4	154 05.6	30 55.5	154 13.6	30 13.3	154 21.2
45	33 20.2	152 40.2	33 10.7	152 42.7	32 24.2	152 54.8	31 39.7	153 06.3
50	34 55.5	151 08.8	34 45.4	151 12.3	33 56.3	151 29.2	33 09.2	151 45.0
55	36 34.9	149 27.8	36 24.1	149 32.5	35 32.0	149 54.9	34 42.1	150 15.9
23 00	-38 18.9	+147 34.7	-38 07.5	+147 40.8	-37 11.9	+148 10.0	-36 18.9	+148 37.2
05	40 08.6	145 26.2	39 56.3	145 34.0	38 56.8	146 11.6	38 00.2	146 46.2
10	42 04.9	142 57.1	41 51.7	143 07.3	40 47.6	143 55.6	39 46.9	144 39.7
15	44 09.8	140 00.0	43 55.3	140 13.4	42 45.7	141 16.1	41 40.0	142 12.6
20	46 25.8	136 22.2	46 09.8	136 40.3	44 53.0	138 03.7	43 41.2	139 17.6
25	48 57.8	131 40.0	48 39.6	132 05.7	47 13.1	134 02.0	45 53.1	135 42.0
23 30	-51 56.2	+124 56.7	-51 34.3	+125 38.1	-49 52.3	+128 36.9	-48 20.5	+131 02.0
32	53 20.9	121 07.8	52 56.3	122 01.9	51 04.4	125 47.1	49 25.6	128 41.6
34	55 01.0	115 53.0	54 31.7	117 12.7	52 24.0	122 18.1	50 35.9	125 56.1
36	-57 26.9	+106 02.9	-56 39.1	+109 14.6	53 56.0	117 41.6	51 53.4	122 33.5
23 37	.. .. .	.. .. .	.. .. .	.. .. .	-54 50.2	+114 35.9	-52 35.9	+120 31.4
38	.. .. .	.. .. .	.. .. .	.. .. .	55 55.8	110 21.1	53 22.3	118 08.1
39	.. .. .	.. .. .	.. .. .	.. .. .	-57 51.9	+100 47.4	54 14.2	115 12.5
40	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	55 15.9	111 17.7
41	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	-56 47.5	+104 15.5

DURATION OF ANNULAR PHASE AND WIDTH OF PATH ON CENTRAL LINE

Universal Time h m	80 Km		100 Km		200 Km		300 Km	
	Duration m s	Width of Path mi	Duration m s	Width of Path mi	Duration m s	Width of Path mi	Duration m s	Width of Path mi
20 09	. . . .	...	. . . .	...	. . . .	...	5 23.6	185
10	. . . .	...	. . . .	...	. . . .	...	5 23.5	184
11	. . . .	...	. . . .	...	5 22.4	186	5 32.4	184
12	. . . .	...	. . . .	...	5 27.6	186	5 35.7	183
13	5 16.8	189	5 21.1	188	5 31.6	185	5 38.7	183
20 14	5 24.5	188	5 26.7	187	5 35.0	185	5 41.4	183
16	5 32.7	186	5 34.1	186	5 40.6	184	5 46.3	183
18	5 38.6	186	5 39.8	186	5 45.5	184	5 50.7	183
20 20	5 43.6	185	5 44.7	185	5 49.9	184	5 54.7	182
25	5 53.8	185	5 54.7	185	5 59.2	183	6 03.4	182
30	6 02.2	185	6 03.0	184	6 07.0	183	6 10.9	181
35	6 09.3	185	6 10.0	184	6 13.8	182	6 17.5	181
20 40	6 15.4	184	6 16.1	184	6 19.7	181	6 23.2	180
45	6 20.8	183	6 21.5	183	6 24.9	181	6 28.3	179
50	6 25.5	181	6 26.2	181	6 29.4	179	6 32.7	178
55	6 29.7	181	6 30.3	180	6 33.4	178	6 36.5	176
21 00	6 33.2	179	6 33.8	179	6 36.8	177	6 39.8	174
05	6 36.2	177	6 36.8	176	6 39.7	175	6 42.6	173
10	6 38.8	175	6 39.3	175	6 42.2	172	6 45.0	171
15	6 40.9	173	6 41.4	172	6 44.2	171	6 46.9	168
20	6 42.6	171	6 43.1	171	6 45.8	168	6 48.4	167
25	6 43.8	169	6 44.4	168	6 47.0	166	6 49.6	164
21 30	6 44.7	166	6 45.3	166	6 47.8	164	6 50.3	162
35	6 45.3	165	6 45.8	164	6 48.3	162	6 50.7	160
40	6 45.5	162	6 46.0	162	6 48.4	160	6 50.8	159
45	6 45.5	161	6 46.0	160	6 48.3	159	6 50.6	157
50	6 45.1	159	6 45.6	159	6 47.9	156	6 50.2	155
55	6 44.5	157	6 44.9	157	6 47.2	155	6 49.4	154
22 00	6 43.5	156	6 44.0	155	6 46.2	154	6 48.4	152
05	6 42.4	154	6 42.8	154	6 45.0	152	6 47.2	150
10	6 41.0	153	6 41.4	153	6 43.6	151	6 45.8	149
15	6 39.3	152	6 39.7	152	6 41.9	150	6 44.1	149
20	6 37.4	152	6 37.9	151	6 40.0	150	6 42.2	148
25	6 35.3	151	6 35.7	151	6 37.9	149	6 40.1	148
22 30	6 32.9	151	6 33.4	151	6 35.6	149	6 37.7	147
35	6 30.4	150	6 30.8	150	6 33.0	149	6 35.2	147
40	6 27.5	151	6 27.9	151	6 30.2	149	6 32.4	147
45	6 24.4	151	6 24.9	151	6 27.1	149	6 29.3	148
50	6 21.0	152	6 21.5	151	6 23.8	150	6 26.0	148
55	6 17.3	152	6 17.8	151	6 20.2	150	6 22.5	149
23 00	6 13.3	153	6 13.8	153	6 16.3	151	6 18.7	149
05	6 08.9	155	6 09.4	154	6 12.0	152	6 14.5	150
10	6 04.1	157	6 04.6	156	6 07.3	154	6 09.9	152
15	5 58.7	158	5 59.2	158	6 02.1	156	6 04.9	154
20	5 52.6	161	5 53.2	161	5 56.3	159	5 59.3	156
25	5 45.5	165	5 46.2	164	5 49.7	162	5 53.0	159
23 30	5 36.7	170	5 37.6	170	5 41.9	166	5 45.7	163
32	5 32.3	173	5 33.4	172	5 38.2	168	5 42.4	165
34	5 26.9	177	5 28.3	176	5 34.0	171	5 38.7	167
36	5 18.2	185	5 20.8	182	5 28.9	175	5 34.5	170
23 37	. . . .	...	. . . .	...	5 25.8	177	5 32.1	172
38	. . . .	...	. . . .	...	5 21.8	181	5 29.5	173
39	. . . .	...	. . . .	...	5 13.9	187	5 26.4	176
40	. . . .	...	. . . .	...	. . . .	...	5 22.6	178
41	. . . .	...	. . . .	...	. . . .	...	5 16.5	183

LOCAL CIRCUMSTANCES FOR POINTS ON CENTRAL LINE

Universal Time	Central Line		First Contact			Second Contact		
	Latitude	Longitude	Universal Time	P	V	Universal Time	P	V
h m	° '	° '	h m s	°	°	h m s	°	°
20 15	- 4 15.0	-151 06.7	.. .. .	...	...	20 12 20.3	295	30
16	3 53.7	154 44.1	.. .. .	...	...	20 13 17.2	296	31
17	3 44.6	157 01.5	.. .. .	...	...	20 14 15.1	296	32
18	3 40.1	158 49.2	.. .. .	...	...	20 15 13.4	297	33
20 20	- 3 38.1	-161 39.4	.. .. .	...	...	20 17 10.5	298	34
22	3 41.6	163 55.4	.. .. .	...	...	20 19 08.1	299	35
24	3 48.4	165 50.6	19 06 33.2	297	31	20 21 05.9	300	37
26	3 57.6	167 31.4	19 07 10.9	297	32	20 23 04.0	300	38
28	4 08.5	169 01.7	19 07 54.2	298	33	20 25 02.2	301	39
20 30	- 4 20.9	-170 23.6	19 08 41.9	298	34	20 27 00.6	302	41
35	4 56.5	173 21.6	19 10 56.3	299	36	20 31 56.9	303	44
40	5 37.2	175 51.9	19 13 27.1	301	38	20 36 53.8	305	47
45	6 21.6	178 02.6	19 16 10.7	302	41	20 41 51.0	306	50
50	7 09.2	-179 58.7	19 19 05.0	303	43	20 46 48.6	307	54
55	7 59.2	+178 16.6	19 22 08.6	304	45	20 51 46.5	308	57
21 00	- 8 51.6	+176 41.0	19 25 21.0	305	48	20 56 44.7	309	61
05	9 45.9	175 12.9	19 28 41.4	306	50	21 01 43.1	310	64
10	10 42.1	173 51.0	19 32 09.5	306	53	21 06 41.8	311	68
15	11 40.0	172 34.1	19 35 45.2	307	56	21 11 40.7	312	72
20	12 39.6	171 21.5	19 39 28.2	308	58	21 16 39.8	313	76
25	13 40.7	170 12.3	19 43 18.5	309	61	21 21 39.2	314	80
21 30	-14 43.4	+169 06.1	19 47 16.1	310	64	21 26 38.7	315	85
35	15 47.6	168 02.1	19 51 20.9	310	66	21 31 38.4	315	89
40	16 53.4	166 59.9	19 55 32.9	311	69	21 36 38.3	316	94
45	18 00.7	165 59.1	19 59 52.5	312	72	21 41 38.3	316	99
50	19 09.6	164 59.1	20 04 19.4	312	75	21 46 38.5	317	103
55	20 20.2	163 59.5	20 08 53.8	313	78	21 51 38.8	317	108
22 00	-21 32.5	+162 59.9	20 13 35.7	313	82	21 56 39.2	317	113
05	22 46.5	161 59.7	20 18 25.4	314	85	22 01 39.8	317	117
10	24 02.4	160 58.6	20 23 22.9	314	88	22 06 40.5	317	122
15	25 20.3	159 56.0	20 28 28.3	315	92	22 11 41.3	317	126
20	26 40.3	158 51.3	20 33 42.1	315	96	22 16 42.2	317	130
25	28 02.5	157 43.8	20 39 04.1	315	99	22 21 43.3	317	134
22 30	-29 27.3	+156 32.9	20 44 34.9	315	103	22 26 44.5	317	137
35	30 54.8	155 17.7	20 50 14.5	315	107	22 31 45.8	317	140
40	32 25.3	153 57.1	20 56 03.7	315	111	22 36 47.2	316	143
45	33 59.1	152 29.8	21 02 02.6	315	115	22 41 48.8	316	145
50	35 36.8	150 54.2	21 08 12.1	315	119	22 46 50.5	315	148
55	37 18.8	149 08.4	21 14 32.8	314	123	22 51 52.4	315	150
23 00	-39 05.9	+147 09.3	21 21 05.8	314	127	22 56 54.4	314	151
05	40 59.0	144 53.1	21 27 52.7	313	130	23 01 56.6	313	153
10	42 59.5	142 14.2	21 34 55.7	313	134	23 06 59.1	312	154
15	45 09.5	139 03.3	21 42 17.7	312	137	23 12 01.9	311	154
20	47 32.3	135 04.8	21 50 04.5	311	141	23 17 05.0	310	155
23 22	-48 34.2	+133 10.0	21 53 20.3	310	142	23 19 06.5	309	155
24	49 39.7	130 59.7	21 56 42.7	309	143	23 21 08.0	308	155
26	50 49.7	128 28.7	22 00 13.3	309	144	23 23 09.7	308	155
28	52 05.7	125 28.9	22 03 54.9	308	145	23 25 11.5	307	155
30	53 30.4	121 44.8	22 07 52.6	307	146	23 27 13.6	306	154
23 31	-54 17.5	+119 26.8	22 10 00.5	307	147	23 28 14.8	305	154
32	55 09.6	116 41.1	22 12 17.8	306	147	23 29 16.2	305	154
33	56 09.6	113 09.1	22 14 50.5	305	148	23 30 17.9	304	153
34	-57 26.6	+107 53.4	22 17 57.0	304	148	23 31 20.1	303	153

LOCAL CIRCUMSTANCES FOR POINTS ON CENTRAL LINE

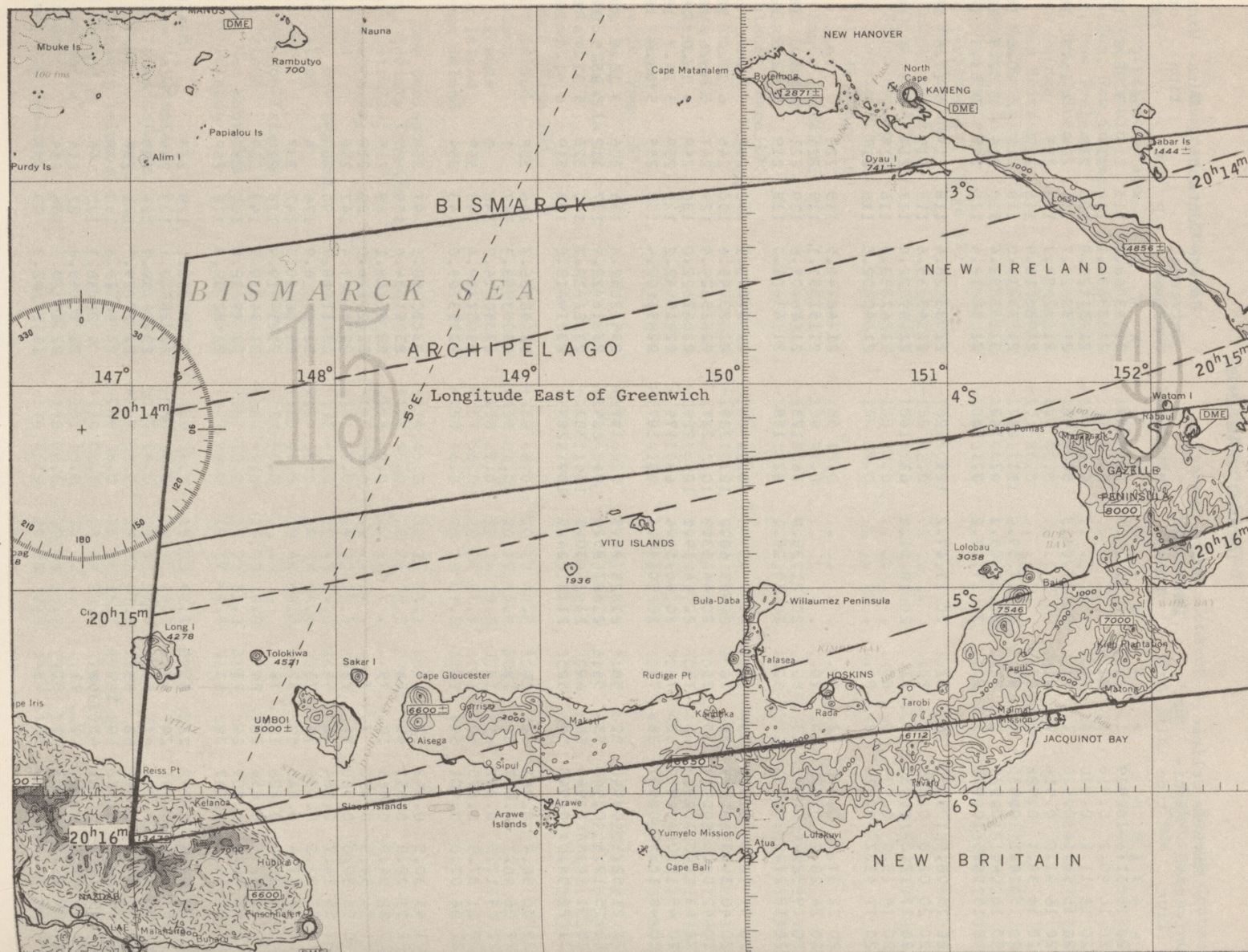
Maximum Eclipse						Third Contact				Fourth Contact				Dura- Width			
Universal			Magni-	Sun's		Universal			P	V	Universal			P	V	tion	of
Time			tude	Alt.	Az.	Time			o	o	Time			o	o	m	s
h	m	s		o	o	h	m	s			h	m	s				
20	15	00.0	0.929	4	81	20	17	39.7	115	210	21	33	58.9	117	216	5	19.4
20	16	00.0	0.930	8	81	20	18	42.8	116	211	21	37	58.0	119	218	5	25.6
20	17	00.0	0.931	10	81	20	19	44.9	116	212	21	40	58.6	120	219	5	29.8
20	18	00.0	0.931	13	80	20	20	46.6	117	213	21	43	36.9	120	220	5	33.2
20	20	00.0	0.932	16	80	20	22	49.5	118	214	21	48	18.8	122	223	5	39.0
20	22	00.0	0.933	19	80	20	24	51.9	119	216	21	52	33.3	123	225	5	43.8
20	24	00.0	0.933	21	79	20	26	54.1	120	217	21	56	30.3	124	227	5	48.2
20	26	00.0	0.934	23	79	20	28	56.0	120	218	22	00	14.5	125	229	5	52.0
20	28	00.0	0.934	25	79	20	30	57.8	121	220	22	03	48.6	125	231	5	55.6
20	30	00.0	0.935	27	78	20	32	59.4	122	221	22	07	14.2	126	233	5	58.8
20	35	00.0	0.936	31	77	20	38	03.1	123	224	22	15	18.8	128	239	6	06.2
20	40	00.0	0.936	34	76	20	43	06.2	125	228	22	22	49.7	130	245	6	12.4
20	45	00.0	0.937	37	74	20	48	09.0	126	231	22	29	53.6	131	251	6	18.0
20	50	00.0	0.938	40	72	20	53	11.4	127	234	22	36	34.6	132	258	6	22.8
20	55	00.0	0.938	43	71	20	58	13.5	128	238	22	42	56.4	133	266	6	27.0
21	00	00.0	0.939	45	68	21	03	15.3	129	242	22	49	01.1	134	274	6	30.6
21	05	00.0	0.939	47	66	21	08	16.9	130	245	22	54	51.0	135	283	6	33.8
21	10	00.0	0.939	49	63	21	13	18.2	131	249	23	00	27.4	136	291	6	36.4
21	15	00.0	0.940	51	61	21	18	19.3	132	253	23	05	52.1	137	300	6	38.6
21	20	00.0	0.940	52	57	21	23	20.2	133	258	23	11	06.1	137	307	6	40.4
21	25	00.0	0.940	54	54	21	28	20.8	134	262	23	16	10.4	138	315	6	41.6
21	30	00.0	0.940	55	50	21	33	21.3	135	267	23	21	05.9	138	321	6	42.6
21	35	00.0	0.940	56	46	21	38	21.6	135	271	23	25	53.4	138	326	6	43.2
21	40	00.0	0.941	57	42	21	43	21.7	136	276	23	30	33.4	139	331	6	43.4
21	45	00.0	0.941	57	38	21	48	21.7	136	281	23	35	06.5	139	335	6	43.4
21	50	00.0	0.941	57	34	21	53	21.5	137	286	23	39	33.2	139	338	6	43.0
21	55	00.0	0.941	58	29	21	58	21.2	137	291	23	43	53.8	139	341	6	42.4
22	00	00.0	0.941	57	24	22	03	20.8	137	295	23	46	08.5	139	343	6	41.6
22	05	00.0	0.941	57	20	22	08	20.2	137	300	23	52	17.7	139	345	6	40.4
22	10	00.0	0.941	56	15	22	13	19.5	137	305	23	56	21.6	138	347	6	39.0
22	15	00.0	0.940	56	11	22	18	18.7	137	309	0	00	20.2	138	348	6	37.4
22	20	00.0	0.940	55	7	22	23	17.8	137	313	0	04	13.6	138	349	6	35.6
22	25	00.0	0.940	53	3	22	28	16.7	137	316	0	08	01.7	137	349	6	33.4
22	30	00.0	0.940	52	359	22	33	15.5	137	319	0	11	44.8	137	350	6	31.0
22	35	00.0	0.940	51	355	22	38	14.2	137	322	0	15	22.4	136	350	6	28.4
22	40	00.0	0.939	49	351	22	43	12.8	136	325	0	18	54.6	136	350	6	25.6
22	45	00.0	0.939	47	347	22	48	11.2	136	327	0	22	21.1	135	350	6	22.4
22	50	00.0	0.939	45	344	22	53	09.5	135	329	0	25	41.3	134	349	6	19.0
22	55	00.0	0.938	42	340	22	58	07.6	135	331	0	28	55.0	134	349	6	15.2
23	00	00.0	0.938	40	337	23	03	05.6	134	333	0	32	01.4	133	348	6	11.2
23	05	00.0	0.937	37	333	23	08	03.4	133	334	0	34	59.3	132	347	6	06.8
23	10	00.0	0.936	34	330	23	13	00.9	132	335	0	37	47.3	131	346	6	01.8
23	15	00.0	0.936	30	326	23	17	58.1	131	335	0	40	23.0	129	345	5	56.2
23	20	00.0	0.935	26	321	23	22	55.0	130	336	0	42	42.1	128	344	5	50.0
23	22	00.0	0.934	24	319	23	24	53.5	129	336	0	43	31.5	128	343	5	47.0
23	24	00.0	0.934	22	317	23	26	52.0	128	336	0	44	16.1	127	342	5	44.0
23	26	00.0	0.933	20	314	23	28	50.3	128	335	0	44	54.7	126	341	5	40.6
23	28	00.0	0.933	18	311	23	30	48.5	127	335	0	45	25.0	125	340	5	37.0
23	30	00.0	0.932	15	308	23	32	46.4	126	335	0	45	42.9	125	339	5	32.8
23	31	00.0	0.932	13	306	23	33	45.2	125	335	0	45	44.8	124	338	5	30.4
23	32	00.0	0.931	11	303	23	34	43.8	125	334	0	45	39.4	124	337	5	27.6
23	33	00.0	0.931	9	300	23	35	42.1	124	334	..	..	..	...	...	5	24.2
23	34	00.0	0.930	6	295	23	36	39.9	123	333	..	..	..	...	...	5	19.8

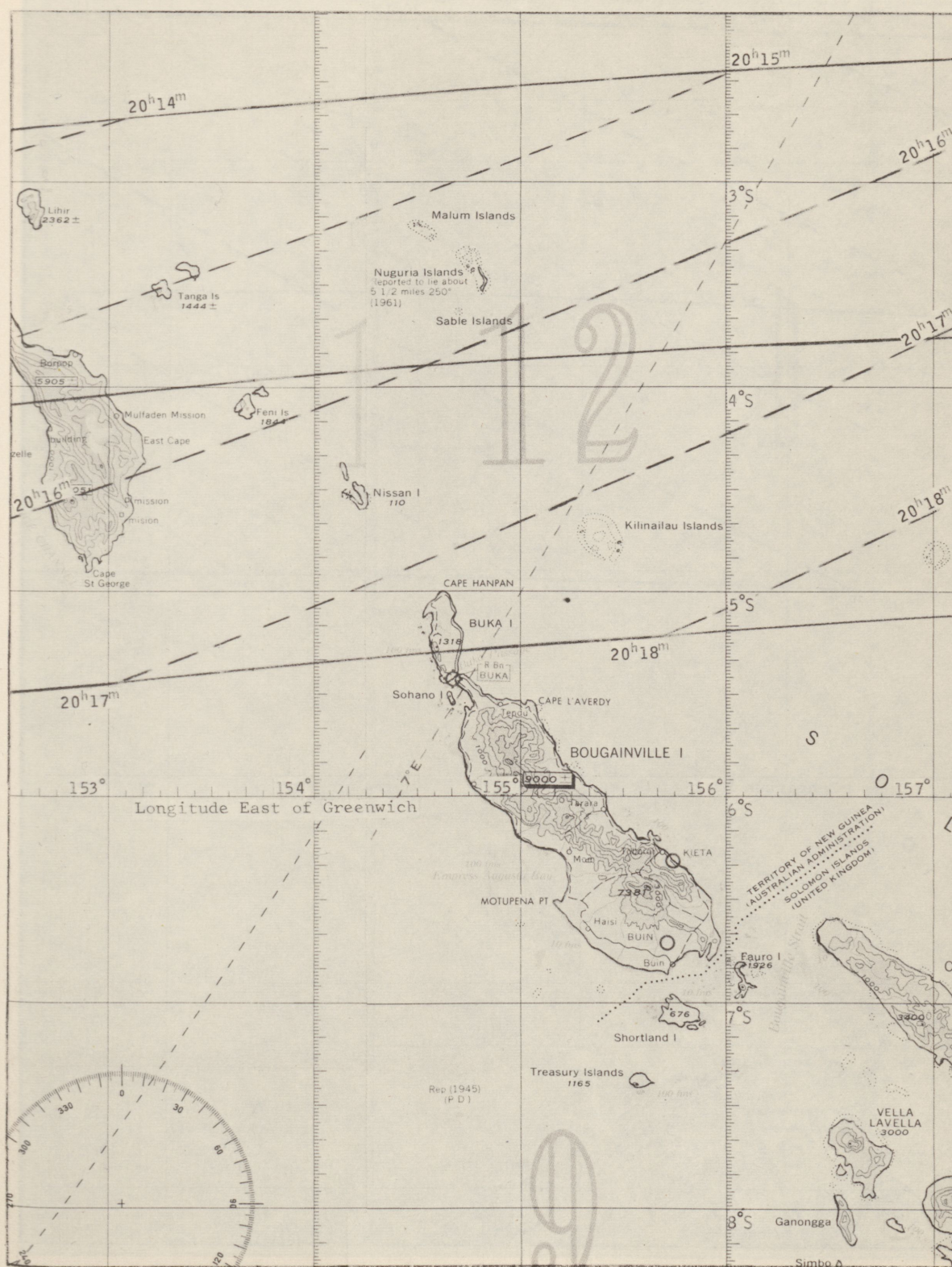
LOCAL CIRCUMSTANCES

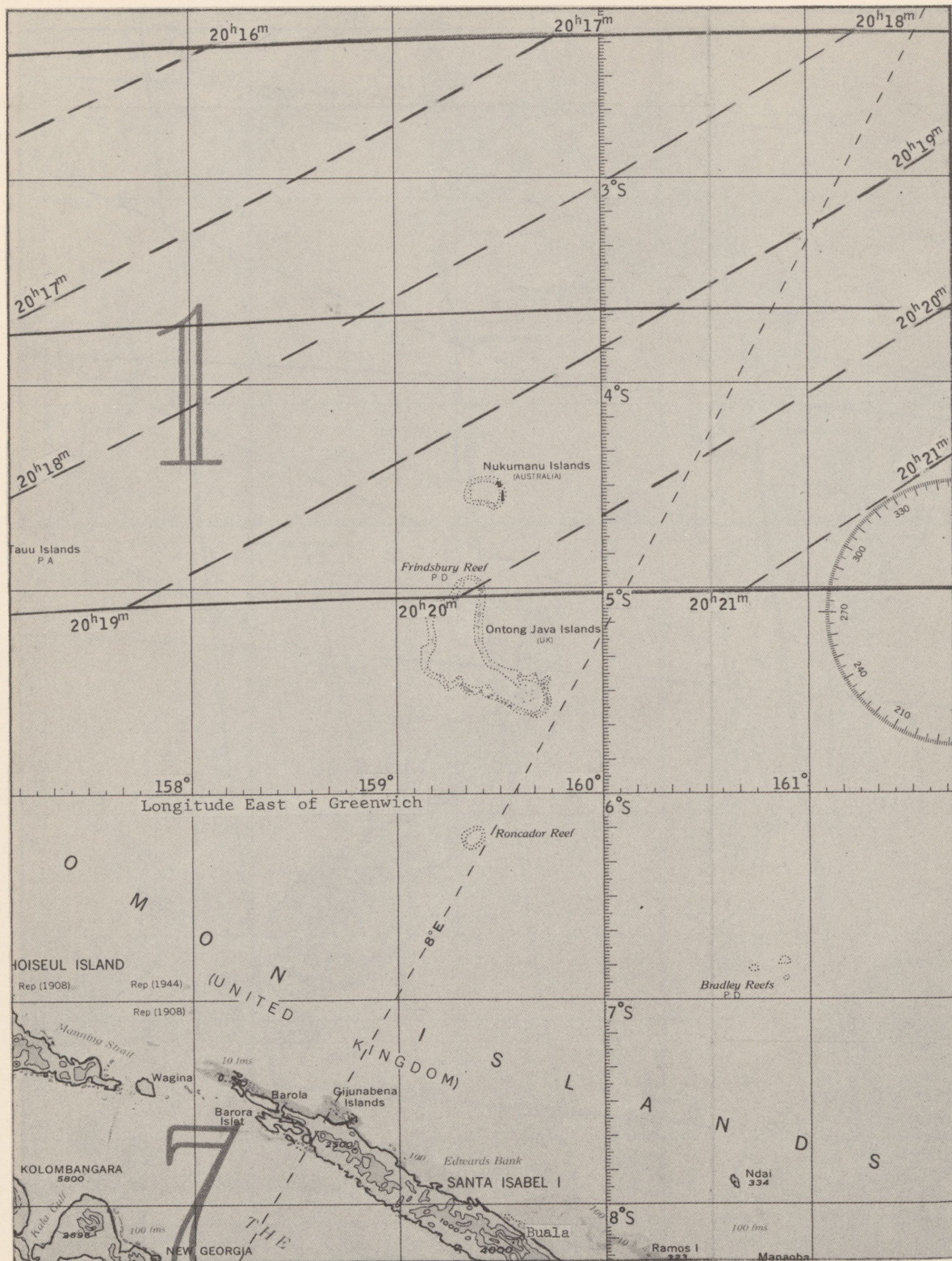
Geographic Locations			First Contact			Second Contact		
	Latitude	Longitude	Universal Time	P	V	Universal Time	P	V
	° ' "	° ' "	h m s	°	°	h m s	°	°
Bismarck Archipelago (Page 14)								
Aisega, New Britain	- 5 44.0	-148 22.0	.. .. .	...	...	20 14 17.5	348	83
Finschhafen, New Guinea	- 6 35.0	-147 51.0	.. .. .	...	...			
Kavieng, New Ireland	- 2 34.0	-150 48.0	.. .. .	...	...			
Kelanoa, New Guinea	- 6 00.0	-147 30.0	.. .. .	...	...	20 14 49.7	358	94
Lae, New Guinea	- 6 45.0	-147 00.0	.. .. .	...	...			
Malmal, New Britain	- 5 39.0	-151 26.0	.. .. .	...	...			
Rabaul, New Britain	- 4 13.0	-152 11.0	.. .. .	...	...	20 12 38.8	299	33
Sipul, New Britain	- 5 51.0	-148 44.0	.. .. .	...	...	20 15 03.2	2	98
Talasea, New Britain	- 5 20.0	-150 01.0	.. .. .	...	...	20 13 53.7	337	73
Bis. Arch.-Solomon Is. (Page 15)								
Borpop, New Ireland	- 3 50.0	-152 50.0	.. .. .	...	...	20 12 29.6	286	20
Buin, Bougainville I.	- 6 52.0	-155 42.0	.. .. .	...	...			
Cape Hanpan, Buka I.	- 5 00.0	-154 37.0	.. .. .	...	...	20 15 32.7	348	84
Kieta, Bougainville I.	- 6 15.0	-155 37.0	.. .. .	...	...			
Sohano, Bougainville I.	- 5 26.0	-154 39.0	.. .. .	...	...			
Solomon Islands (Page 16)								
Barora Islet	- 7 34.0	-158 19.0	.. .. .	...	...			
Buala, Santa Isabel I.	- 8 11.0	-159 37.0	.. .. .	...	...			
Nukumanu Islands	- 4 33.0	-159 30.0	.. .. .	...	...	20 17 25.9	338	75
Tauu Islands	- 4 51.0	-157 17.0	.. .. .	...	...	20 16 51.6	351	88
Ellice Islands (Page 17)								
Funafuti Atoll	- 8 30.0	-179 12.0	19 20 34.8	305	46			
Nanomea Atoll	- 5 40.0	-176 10.0	19 13 44.0	301	39	20 37 27.8	303	46
Nanumanga Atoll	- 6 18.0	-176 20.0	19 14 45.8	302	40	20 39 06.7	327	71
Niutao Atoll	- 6 06.0	-177 16.0	19 15 10.5	301	40	20 40 03.0	306	50
Nui Atoll	- 7 15.0	-177 10.0	19 16 50.1	303	43	20 43 28.7	3	108
Vaitupu Island	- 7 28.0	-178 41.0	19 18 25.6	303	44	20 45 43.0	343	89
Samoa Islands (Page 18)								
Apia, Upolu I.	-13 48.0	+171 45.0	19 41 18.9	310	61	21 20 16.8	15	140
Pago Pago, Tutuila I.	-14 16.0	+170 43.0	19 43 48.9	310	62	21 22 39.5	352	119
Rose Island	-14 32.0	+168 11.0	19 48 18.8	309	63	21 28 59.1	276	47
Tau Island	-14 15.0	+169 27.0	19 45 41.5	309	62	21 24 43.5	310	79
Cook Islands (Page 19)								
Aitutaki Island	-18 52.0	+159 46.0	20 13 40.8	309	76			
Atiu Island	-20 00.0	+158 07.0	20 19 44.8	308	80			
Hervey Islands	-19 16.0	+158 57.0	20 16 18.3	308	77			
Mangaia Island	-21 56.0	+157 56.0	20 24 31.1	310	85			
Rarotonga Island	-21 12.0	+159 46.0	20 19 01.5	311	82			
Auckland, New Zealand	-36 55.0	-174 45.0	20 26 57.1	337	111			
Bora Bora, Society Islands	-16 30.0	+151 45.0	20 28 08.2	299	74			
Brisbane, Australia	-27 30.0	-153 00.0	.. .. .	...	...			
Canberra, Australia	-35 18.0	-149 08.0	.. .. .	...	...			
Canton Island	- 2 50.0	+171 40.0	19 22 23.7	295	33			
Christchurch, New Zealand	-43 33.0	-172 40.0	20 43 59.0	342	123			
Christmas Island	+ 2 00.0	+157 30.0	19 45 54.4	281	18			
Danger Island	-10 53.0	+165 49.0	19 44 48.8	304	54			
Honiara, Solomon Islands	- 9 25.0	-159 58.0	.. .. .	...	...			
Kwajalein Island	+ 8 44.0	-167 44.0	19 00 19.9	277	358			
Luganville, New Hebrides	-15 31.0	-167 10.0	19 25 31.3	314	60			
Nandi, Fiji Islands	-17 47.0	-177 29.0	19 37 49.3	317	69			
Nauru Island	- 0 31.0	-166 56.0	19 03 40.1	292	23			
Noumea, New Caledonia	-22 16.0	-166 26.0	19 40 20.2	323	76			
Nukualofa, Tonga Islands	-21 09.0	+175 14.0	19 53 57.5	319	78			
Palmyra Island	+ 5 52.0	+162 05.0	19 32 37.5	278	8			
Papeete, Society Islands	-17 34.0	+149 36.0	20 36 16.1	298	80			
Pitcairn Island	-25 04.0	+130 06.0	21 49 33.6	279	125			
Sydney, Australia	-33 55.0	-151 10.0	.. .. .	...	...			
Tarawa Island	+ 1 30.0	-173 00.0	19 04 13.7	290	19			
Wellington, New Zealand	-41 17.1	-174 45.9	20 39 18.3	340	119			

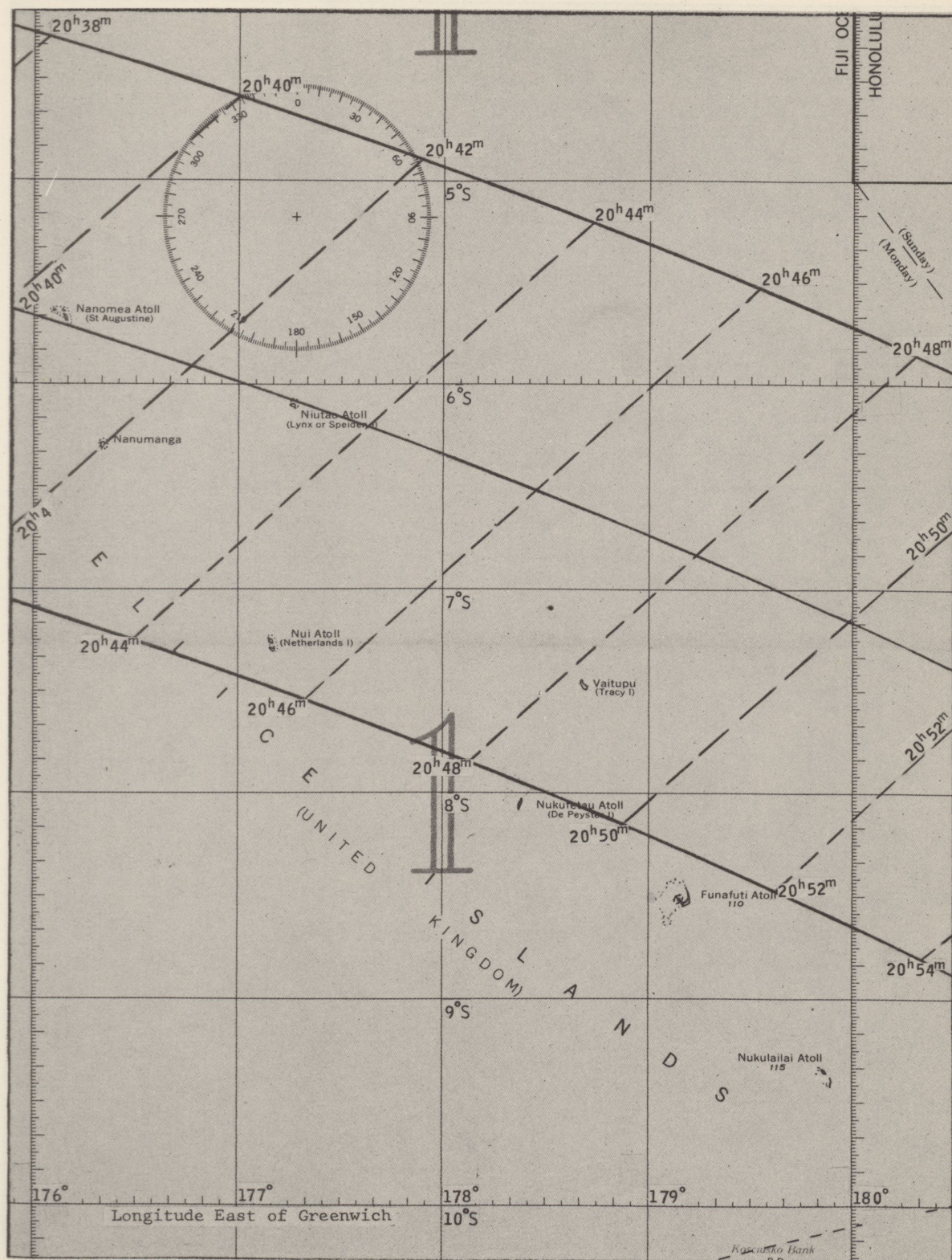
LOCAL CIRCUMSTANCES

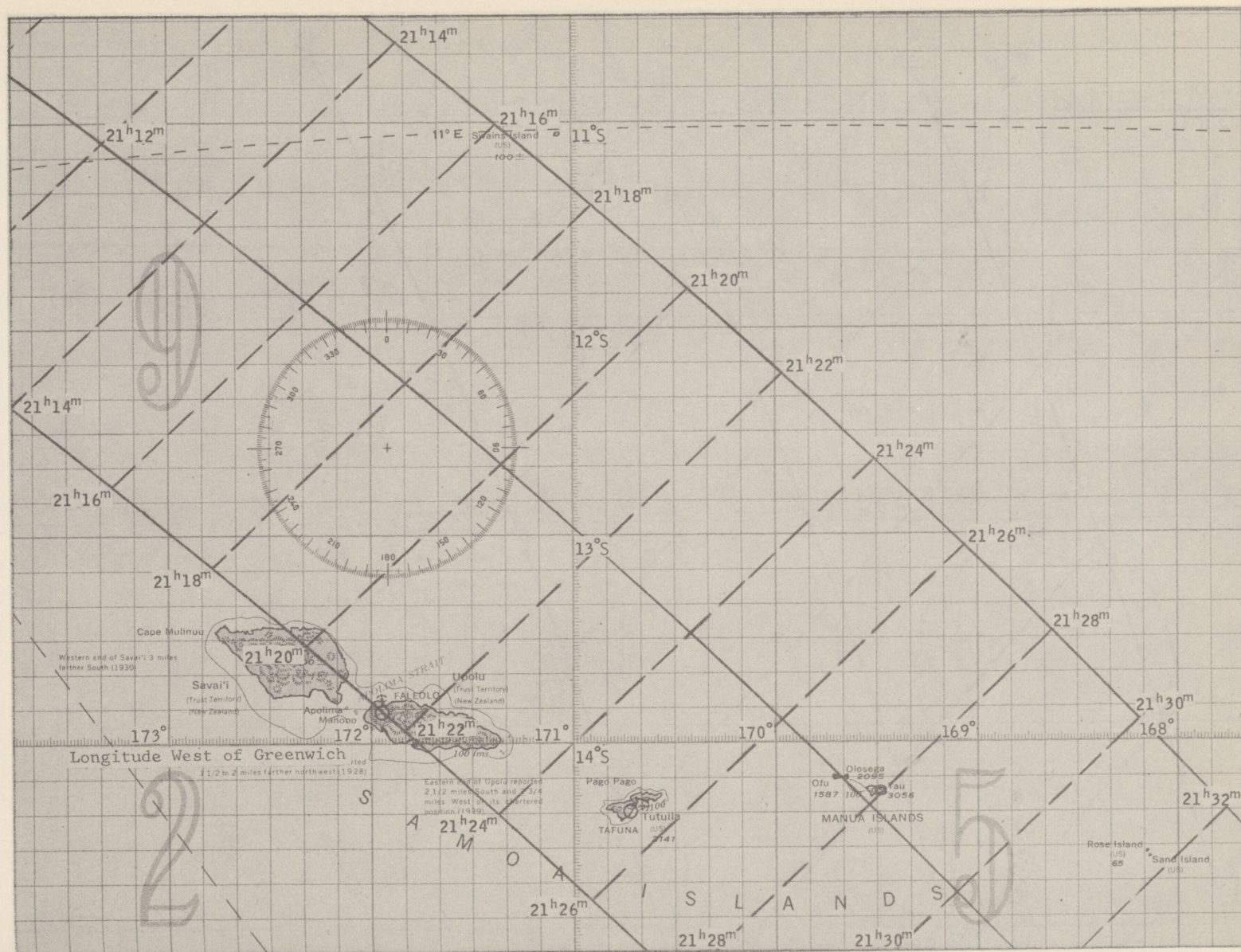
Maximum Eclipse			Sun's		Third Contact			Fourth Contact			Dura-		Width	
Universal	Magni-	Alt.	Az.		Universal	P	V	Universal	P	V	tion		of	
Time	tude				Time			Time			m	s	mi	Path
h m s	°	°			h m s	°	°	h m s	°	°				
20 15 51.6	0.929	1	81		20 17 25.7	61	157	21 33 00.2	115	214	3	08.2	189	
20 16 40.2	0.916	1	81					21 33 34.1	114	214				
20 13 11.1	0.920	4	81					21 31 20.9	120	215				
20 15 58.1	0.928	1	81		20 17 06.5	50	146	21 32 29.7	114	214	2	16.8	189	
20 16 41.0	0.914	0	81					21 32 57.7	113	213				
20 16 38.1	0.928	5	81					21 36 13.9	115	215				
20 15 19.1	0.930	5	81		20 17 59.4	111	207	21 35 11.0	118	216	5	20.6	189	
20 16 04.1	0.929	2	81		20 17 05.1	47	143	21 33 31.4	115	214	2	01.9	189	
20 15 50.5	0.929	3	81		20 17 47.2	72	168	21 34 12.4	116	215	3	53.5	189	
20 15 08.4	0.930	6	81		20 17 47.2	125	220	21 35 26.4	118	217	5	17.6	189	
20 20 02.0	0.889	9	80					21 43 33.6	115	218				
20 17 12.2	0.930	8	81		20 18 51.8	63	160	21 39 22.9	117	217	3	19.1	188	
20 19 13.0	0.904	9	80					21 42 33.8	116	218				
20 17 43.7	0.926	8	81					21 40 02.5	116	217				
20 22 37.9	0.870	12	79					21 48 41.5	115	220				
20 24 28.2	0.855	14	79					21 51 51.1	115	221				
20 19 32.4	0.932	13	80		20 21 38.9	76	173	21 46 05.5	119	221	4	13.0	187	
20 18 27.8	0.931	11	80		20 20 04.1	62	159	21 43 01.0	118	219	3	12.5	187	
20 51 16.8	0.932	39	72					22 37 43.1	130	258				
20 40 34.3	0.937	35	76		20 43 40.8	127	233	22 23 40.6	130	246	6	13.0	185	
20 42 00.0	0.937	35	75		20 44 53.3	103	207	22 25 29.9	129	247	5	46.6	185	
20 43 11.0	0.937	36	75		20 46 19.0	125	229	22 27 22.0	130	249	6	16.0	185	
20 45 11.0	0.937	36	74		20 46 53.4	68	174	22 29 42.2	129	250	3	24.7	185	
20 48 16.2	0.937	38	73		20 50 49.4	90	197	22 34 02.4	130	255	5	06.4	184	
21 21 52.1	0.940	52	56		21 23 27.5	72	197	23 12 52.4	136	306	3	10.7	172	
21 25 17.3	0.940	53	54		21 27 55.0	96	224	23 16 22.9	137	312	5	15.5	170	
21 31 34.8	0.940	56	49		21 34 10.5	174	307	23 22 38.7	140	326	5	11.4	167	
21 28 04.0	0.940	54	52		21 31 24.5	139	269	23 19 13.0	138	319	6	41.0	169	
22 00 36.4	0.863	61	20					23 48 06.7	146	358				
22 06 46.7	0.847	61	13					23 53 03.3	147	1				
22 03 17.5	0.852	61	17					23 50 14.2	146	0				
22 11 37.9	0.875	59	10					23 57 19.4	145	359				
22 06 07.0	0.901	59	16					23 53 03.0	143	354				
21 45 30.5	0.443	32	47					23 10 50.5	97	258				
22 11 28.3	0.651	65	358					23 51 54.6	159	25				
20 52 04.9	0.465	10	75					22 05 48.1	89	215				
21 04 54.3	0.350	7	74					22 09 26.0	80	212				
20 56 59.0	0.780	51	73					22 44 07.4	147	284				
21 55 14.7	0.364	27	44					23 11 18.7	90	252				
21 13 22.5	0.438	70	70					22 45 26.9	174	24				
21 27 47.4	0.845	59	52					23 18 08.3	147	337				
20 26 32.4	0.826	15	78					21 54 19.9	113	221				
20 11 32.3	0.636	21	84					21 34 38.5	143	229				
20 45 06.0	0.709	24	73					22 19 32.8	110	233				
21 07 55.6	0.737	38	63					22 52 03.8	118	262				
20 20 42.9	0.882	22	81					21 52 30.1	129	228				
20 57 41.0	0.581	24	69					22 28 00.1	103	234				
21 31 36.2	0.768	47	50					23 18 59.9	124	293				
20 56 37.1	0.442	62	83					22 27 29.5	171	288				
22 18 22.6	0.622	64	349					23 56 25.6	160	29				
23 09 19.9	0.381	41	308					0 21 36.1	170	46				
21 03 42.5	0.369	9	73					22 10 43.8	82	214				
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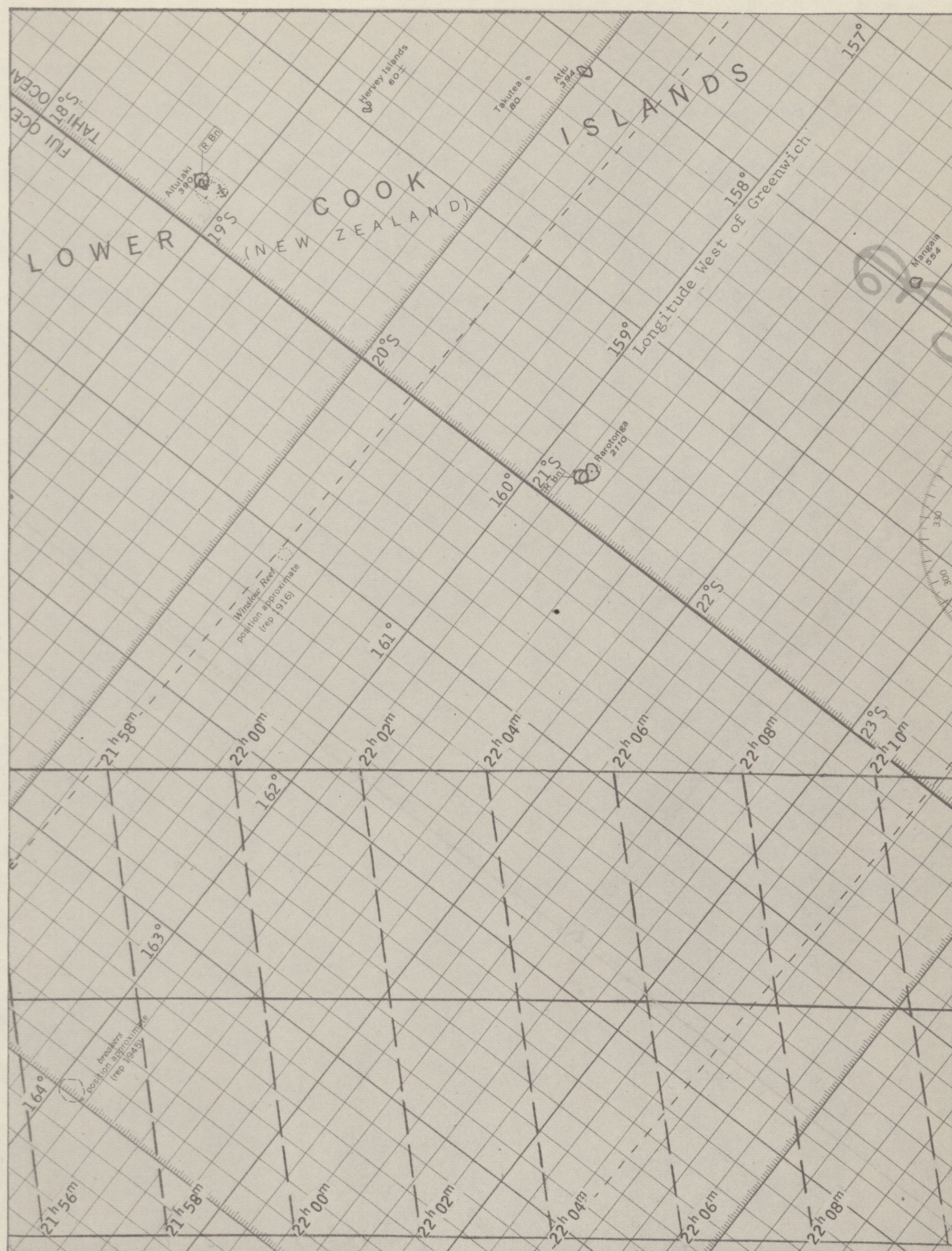












ANNULAR SOLAR ECLIPSE OF 31 AUGUST - 1 SEPTEMBER 1970

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